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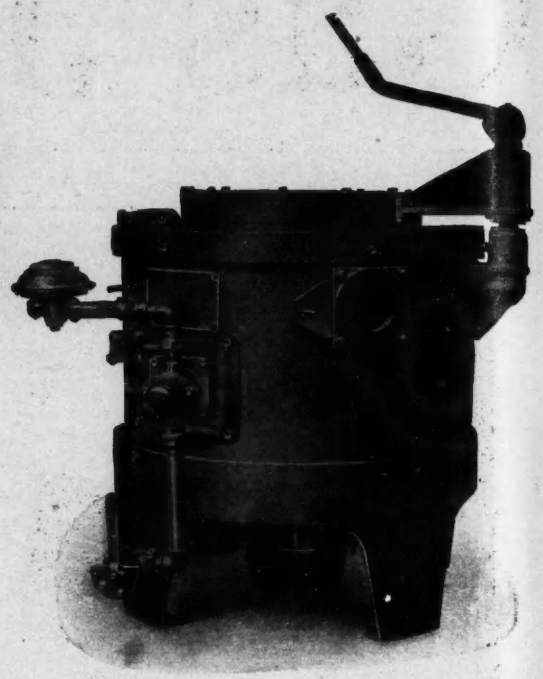

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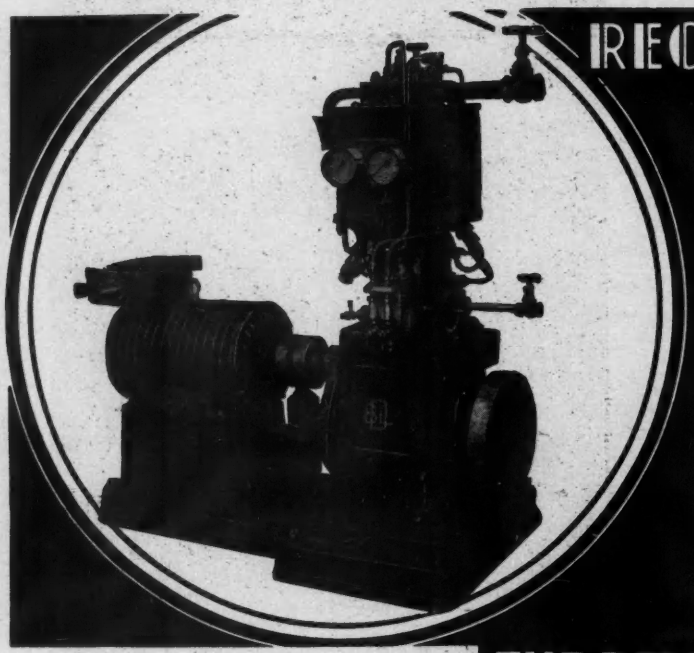

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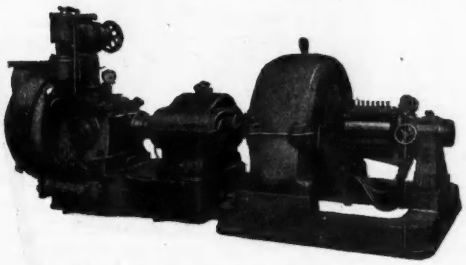

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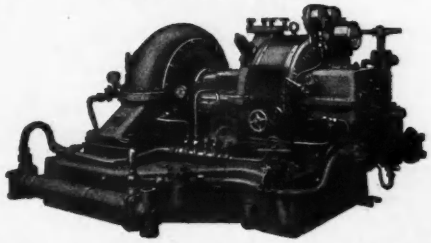

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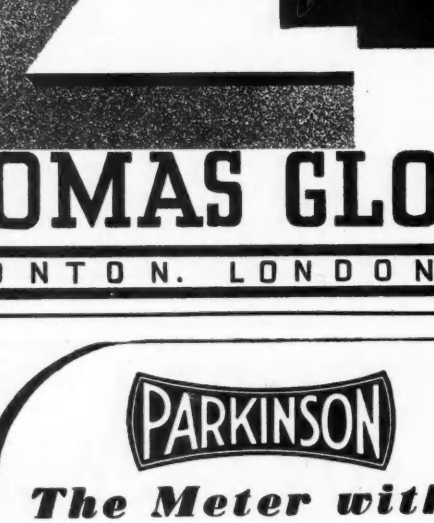

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p. 5

GAS JOURNAL, APRIL 28, 1943

VOL. 241 95th YEAR No. 4171

EDITORIAL NOTES

TREND OF THOUGHT

SIGNS of feverish activity on the Gas Industry planning front are still hard to discern, but districts will have welcomed in the past week or so receipt of a memorandum sent them by the Utilization Sub-Committee of the central body. We have been shown a copy, but it is not appropriate that we should comment on its contents before the district planning committees have had an opportunity of examining them. They do at least provide matter for the districts to discuss—and it must never be forgotten that it is neither possible nor desirable for a "master plan" to be produced, as it were from the conjuror's hat, in London or anywhere else. It is, furthermore, of little use for the districts to claim a voice in the shaping of affairs unless they show that they possess one which they are capable of using with good effect. Quite frankly the activities (or absence thereof) of certain district planning committees have been very disappointing to some of their keenest constituents, and an attitude of "leave it to others and then grumble" will get the Industry nowhere, as Dr. E. W. Smith so frequently emphasized when he was in office.

Meanwhile the fact-finding sub-committee under Mr. A. E. Sylvester's chairmanship works on undaunted by such criticism as has been levelled at it—most of it quite uninformed. It cannot be too strongly emphasized that it is no part of this committee's task to produce a plan for the future organization of the Industry; its sole purpose is to record facts upon which a plan can be based—or, shall we say, upon which evidence can be given before the Enquiry which is surely bound eventually to take place. The faith of some people in the efficacy of such fact finding has, we believe, even led to requests being made to the committee for information obviously required to serve private ends. This again is clearly no part of its work, but it is an interesting commentary upon the general absence of available statistics upon which to plan anything at all in the shape of gas development. We do seriously urge those for whom it is possible to take advantage of the "open house" kept at headquarters by this sub-committee, and to have a look at the work in progress. We are assured that quite a number of sceptics have been converted in this way to willing co-operators. The work is being done against time, and all possible help is needed.

Now, in the outwardly calm scene, we detect the faint echo of some dangerously quick thinking. With quick thinking we have no quarrel on principle, but the Gas Industry never has had quite the cohesion needed for making rapid decisions wisely, and there is always danger that lack of thought may be mistaken for quick thinking. Based upon the retirement of Sir David Milne-Watson from National Gas Council offices, we have heard it suggested that now is the time to introduce the professional Director-General (or whatever his title is to be) who is envisaged in the reorganization scheme of the national bodies. We are not necessarily opposed to this step being taken, but the danger as we see it is that some, at all events, of its advocates visualize therein once again the conjuror and his traditional hat. Ask them whether it is a dictator they want, or one who will carry out decisions taken by the "electorate"? Is he to be the great business organizer who co-ordinates the work of national committees (which, after all, will still have to exist), or the "show" man who is to spend his time lunching with politicians and persuading them to make laws abolishing the use of raw coal, electricity, and every other "nuisance" to the Gas Industry? Is he in fact to be the "one voice" speaking for the Industry which we have all been seeking for long years? The answer, we are afraid, is only too often that he shall be all or any of these things so long as he removes from others any further need to think for themselves or for the Industry, to plan, or to act in any way except some way which shall be decided for them—and naturally all decisions will be completely pleasing to everybody. No, we do not think it will be quite as simple as that. We do think there is danger in supposing that any one way can be the easy way to avoid further effort.

RESEARCH

IN the "JOURNAL" of April 14 we commented briefly on the clear outline which, in his dual capacity of President of The Institution of Gas Engineers and Chairman of the Gas Research Board, Mr. E. V. Evans gave on April 9 of the new organization of the Board, which seems to us on so many grounds admirable. We referred particularly to the definition which appears likely to be given—and we hope with satisfaction to all concerned—of the fields of work of the State-aided fuel research associations through the Co-ordinating Committee under the Chairmanship of Sir Harold Hartley. In various investigations in the past there has been overlapping between, for instance, the Gas Industry itself (we are thinking of the work of the Joint Research Committee) and the Fuel Research Board, as also there have been occasions when valuable work carried out by the Industry came to a full stop when interest was really aroused and when the possibilities of continuation became evident. An example was the investigation carried out by Dr. Parker—then of the Gas Industry; now the newly appointed Director of Fuel Research—on the steaming of continuous vertical retorts; we could cite other examples, but this will serve to point to the lack of co-operation between the Industry and the Fuel Research Board. While, however, team-work overlapping of the type indicated is undesirable, to our mind it is wrong to suggest that any one method of approach to a particular problem of research is the right one, and it would be unfortunate, we think, for problems to be tackled uni-directionally, for many paths may lead to their solution while a single path, however well built, may prove to be only a good looking and well paved by-pass.

In view of this we especially welcome Mr. Evans' definition of the scope and aims of the Gas Research Board as a State-aided organization, and his insistence that individual research effort must not slacken. In his opinion, although the Institution and Leeds University have played an important part in the Industry's development work, the majority has come from the individual effort of gas undertakings and of plant and appliance manufacturers. Our Industry, he said, must equip itself to do more research of a day-to-day type, depending on the Board to co-ordinate, to a reasonable degree, this work, and to take over those problems of long-distance and fundamental work that are best solved in a national way. And, on the matter of approach to fundamental questions, of which we have spoken, it seems to us an excellent feature that, though in time the Board will have an experimental station of its own, work which can be better carried on at a university where there exists a particular expert school of thought and experience (as at Leeds) will be placed at that university. Again, it may well be that the Board will place certain of its problems in the laboratories of gas undertakings or the laboratories of plant and appliance manufacturers. This idea seems in line with the thoughts expressed on research associations some time ago by Sir Lawrence Bragg, now a member of Council of the Board, whose comments we referred to in the "JOURNAL" of Oct. 28 last. He was remarking on the tendency of research associations, through imperfect contact with industry, to drift on to work which may be excellent, but which is not really along lines of profound value. A board or a committee can become far too impersonal a body to direct research. He took the view that when a new line of research

was started in response to a demand by industry, it would be advantageous if at the same time an "industrial sponsor" was appointed whose responsibility it would be to visit the association's laboratory at short intervals and to spend quite a large part of his time in directing the effort. The Gas Research Board's reversal of the process, as it were, would appear equally to satisfy the requirement which Sir Lawrence Bragg had in mind; on the other hand, there appears no reason why the research association should not be a place to which firms send suitable men from time to time, where assistants and equipment are available, and where they can for a year or more develop some good idea of the longer-range type.

There is another point we would emphasize in Mr. Evans' outline of the work of the Gas Research Board. It is a point we have stressed time and time again. Full use has not been made of the research work which has already been carried out by the Industry. Through lack of interpretation valuable findings, instead of being translated into practice, lie buried in the archives. A vast amount of data exists which, unassimilated, lies dormant. In 1937 we commented that these data should be applied to the economic benefit of our Industry, adding, by the way, our feeling that "through a properly organized and directed research association this could the more easily be accomplished" ("JOURNAL" of Feb. 17, 1937). We turn to the remarks of Mr. Evans: "By itself the Board can do very little, for *the Gas Industry must be prepared to interpret and apply its work*." The italics are ours. So important is this, that we would end this note by the following quotation from Mr. Evans' Address, which was published in full in our issue of April 14: "We must possess in the Industry not only men capable of understanding and interpreting modern research, but men in the gas undertakings and elsewhere themselves investigating their day-to-day problems, men in close touch with the Board, men who will transfer to the Board work of fundamental nature which would be better solved in a national way. I sometimes get a little impatient with those who perpetually cry 'Let us have more research! Let us spend more on investigations!' and do not realize that the more research done the more men must there be inside the Industry to interpret and develop it. There is already an immense amount of knowledge and research sleeping quietly in the archives of technical societies or in the technical Press that has never been used or applied. A better slogan would be, 'Let us apply to industry more and more of the research work already done.' The Gas Research Board can do little unless *pari passu* our Industry creates an organization capable of understanding and applying its work. The creation of such an organization is a matter to be fostered by the Institution, and in this the Gas Engineering Advisory Boards with their regional control laboratories will play, I hope, a predominant part."

If this sound advice—and it is fundamental—is followed, and we sincerely trust it will be, then, with the Gas Research Board in its newly established form, the stage would seem to be well set for great developments.

LUMINOUS BURNERS

IN the "JOURNAL" last week the question was resuscitated by Dr. J. S. G. Thomas whether we have in the interregnum between the 1914–18 war and the present one paid sufficient attention to the development and use of appliances of all kinds employing luminous burners as distinct from those of the bunsen type. We ourselves have on several occasions discussed this matter, giving a negative answer to the question. We regard it as unfortunate that the merits of the luminous burner—we use "luminous" for want of a better term, though we know we shall be understood—have to a large extent been ignored during this period of development in the Gas Industry. Reasons for such neglect, however, are not hard to find. In the first place the Industry was founded as a lighting industry and the standard for the sale of gas was a luminosity standard, the candle. As time went on improvements were made in luminous burners for the use of gas for the purpose of giving light, but then came the invention first of the bunsen burner and then of the incandescent mantle for use with such a burner. No longer did the light emitted by gas depend on its intrinsic luminosity, but on its heating value as burned in the bunsen burner. A revolution was wrought in the Industry, and the flat flame burner and the like died a natural death for the purpose of giving illumination, though the passing away was in some instances considerably prolonged. Candle standard was no longer applicable, and heating value became the standard of sale of gas. In the subsequent development of heating and cooking appliances, concentration and attention were directed to the application of the bunsen burner, while little thought was given, apart from the design of water heaters, to the luminous burner. Perhaps a misconception arose that the bunsen burner gave out more heat than the luminous flame burner. Such misconception should certainly not prevail.

We are not saying that we should cease to bother about the bunsen burner and its application and turn exclusively to the luminous burner. Far from it. Each type of burner has its appropriate uses, and it is obvious enough that the bunsen burner has stood us in extraordinarily good stead. Our point is that we ought not to neglect, because of this good service and established practice in appliance design, the possibilities of the luminous burner not only for water heating, but also for cooking and space heating and for industrial purposes. As a matter of fact, prior to the war, we described moves in the direction of which we are speaking, and at the outbreak of war we devoted considerable space to the culmination of work by Radiation Ltd. in the introduction of two fires employing luminous flames —work begun, by the way, as long ago as 1930. We also described the investigations of the South Metropolitan Gas Company into the design of cookers employing luminous burners. Actually, in the autumn of 1941, in connexion with his William Young Memorial Lecture, Mr. Dean Chandler exhibited in Edinburgh a cooker of novel design relying on burners of the luminous type.

Our aim is a trouble-free service necessitating a minimum of maintenance. The desirability of designing appliances which, when once installed in consumers' premises, will not require any attention for a period of, say, five years has been emphasized, and quite optimistic views have been expressed of achieving this end post-war as the result of determined research, and perhaps to an extent a revised outlook. Bunsen burners are sensitive to changes in gas and air adjustment, to pressure and to specific gravity fluctuations; their efficient operation is liable to be impaired by accumulations of dust at the ejector; they are apt to be noisy. The luminous burner, on the other hand, is, we think, more foolproof and more flexible, and it has the great merit of being silent in operation. It would seem that the incidence of maintenance would be reduced by the use of luminous flames. Such, however, were the indications in the years immediately preceding the war, that we feel that post-war the luminous burner is likely to occupy a more honoured place *vis-à-vis* its companion the burner of the bunsen type.

Burning of Pitch-Creosote

On later pages we publish a report of an informal discussion at a meeting of the Institute of Fuel which we attended in Birmingham recently on the burning of pitch-creosote mixtures. The discussion was of a practical nature, and should prove helpful in giving hints on procedure and how to avoid difficulties. We thought the opener of the discussion took a rather gloomy view of the picture, perhaps because of his early difficulties with burner equipment and the pollution of the atmosphere by dense clouds of black smoke. However, he outlined his experiences frankly, and he has by no means been swamped by the difficulties which initially presented themselves, and he is continuing a very extensive use of pitch-creosote mixtures. More optimistic was another speaker, who expressed his astonishment that it should have been deemed necessary to call a meeting to discuss the question, for at his drop forging works he had been burning pitch-creosote mixture for ten or eleven years with satisfaction and without smoke. Another speaker who joined in the discussion explained that over fourteen months' use of pitch-creosote he had experienced "extremely little trouble." He emphasized that he had had no

operating trouble whatever in the change-over from petroleum fuel to the pitch-creosote mixture, which he was now using in very large quantities, and with an efficiency exactly the same as that given by petroleum fuel.

Smoke and Air Defence

In 1940 a Home Security Circular was sent to selected local authorities asking for all industrial works in their areas to produce extra smoke as a means of protection against air attack. Later they were asked to extend these arrangements to coal and oil-burning furnaces of non-industrial undertakings (except private houses) in the selected areas. But now that it is vital to use fuel with the utmost economy the position is entirely changed. Fuel should no longer be used for the purpose of making extra smoke in this way. A Home Security Circular just issued makes it abundantly clear that the overriding need now is that furnaces and boilers should be operated to use fuel with the greatest possible efficiency. Industrial haze due to smoke from factories makes it more difficult for enemy bombers to spot vital points in industrial areas. But, states the Circular, it cannot be stressed too strongly that the fuel situation demands that extra fuel should not be used at present for this purpose. It adds that "the maximum amount of work from the minimum amount of coal is more than a defensive measure: it is one of our strongest weapons of attack. We can and will beat off the enemy with it." And the Circular concludes with the observation, which we know all too well, that black smoke is a sign of fuel waste.

Personal

The British Gas Light Company, Ltd., announce that Mr. J. V. KNIGHT, who has been Engineer and Manager of the Trowbridge, Bradford-on-Avon, and Warminster Undertakings for the past seven years, has been promoted to the post of Assistant Engineer and Manager of the Norwich Station and will take up his new appointment on May 1.

His successor is Mr. G. B. L. WILSON, who has been transferred from the position of Engineer and Manager of the King's Lynn, Downham Market, and Swaffham Undertakings, which will in future be under the charge of Mr. R. A. WESTON, who already combines with his office of Engineer and Manager of the Norwich Station the managership of a number of the Company's other Undertakings in Norfolk.

Mr. H. A. HUNT, who has been in charge of the Maldon and Witham Undertakings for the last few years, returns to Trowbridge and Bradford-on-Avon as District Superintendent, being succeeded by Mr. S. F. GARDINER, who has been promoted from the post of Engineer and Manager of the Storrington, Petworth, and Billingshurst Stations. The new Manager of this last-named group is Mr. R. B. GIBSON, who has been transferred from the Baldock Undertaking, where he had previously been acting as Assistant to his father, Mr. D. M. GIBSON.

* * *

A gold watch has been presented by the Lord Mayor of Birmingham (Councillor W. S. Lewis) on behalf of the Birmingham Gas Committee to Mr. F. I. BRADY, for a conspicuous act of gallantry on Jan. 2. Mr. Brady, who is retort house foreman at the Swan Village Gas-Works, took exceptional risks in rescuing a colleague from death when a waste-heat boiler turbine was wrecked and rendered him unconscious. The act was all the more meritorious in that Mr. Brady is 64 years of age, and at the time of the rescue had only just recovered from a long illness. He has been awarded the B.E.M. (Civil Division), and his name has been inscribed on the Illuminated Roll of Heroes of the Carnegie Fund Trustees.

* * *

Official notification has been received that Captain J. G. CANNING, fourth son of Mr. J. H. Canning, O.B.E., J.P., and Mrs. Canning, of Newport (Mon.), is a prisoner of war in Italian hands. Captain Canning served with the Artists' Rifles before the war, and later was given a commission in the Royal Artillery. A keen "rugger" player, he captained Blackheath "A" for three seasons. He will be remembered by many as a member of the "JOURNAL" staff.

* * *

Mr. NORMAN READMAN has been appointed Secretary to the Consolidated Pneumatic Tool Co., Ltd., in succession to Mr. JOHN PHILP, retired.

Dividend

Montevideo Gas & Dry Dock Company, Ltd.—Final dividend of 3% free of income-tax, 2% of which payable on May 19 and 1% on Dec. 1, making with the interim dividend of 1% paid Dec. 1, 1942, 4% free of income-tax for the year ended Dec. 31, 1942.

British Commercial Gas Association

The following extracts are from the 31st Annual Report of the General Committee:

There has been no annual meeting of members since the ourbreak of war. By consent of the General Committee the Executive Committee adopted on behalf of the membership the Committee's 30th Annual Report and the Association's Accounts for the year ended March 31, 1941. At the same time, the Executive Committee on behalf of the membership, confirmed the continuation of Alderman Ernest Grimsley's period of office as the Association's President, and similarly Messrs. Cash, Stone, & Co. were re-elected auditors for a further year.

The Executive Committee at their meeting in November received with regret the resignation of the President, Alderman Grimsley, on account of ill-health. Councillor Sydney J. Perry followed Alderman Grimsley in office as Chairman of the City of Leicester Gas Committee, and kindly consented to take the Alderman's place as President of the Association.

The Executive Committee re-elected Mr. W. J. Sandeman, J.P., to the office of Executive Chairman for the year 1942, and Colonel F. J. Bywater as a Vice-Chairman. Mr. David Fulton was elected Joint Vice-Chairman with Colonel Bywater. Mr. T. Brown was re-elected Hon. Treasurer.

The Association's advertising, suspended in the spring of 1940, was resumed in October, 1942, with a campaign (which had the approval of the Ministry of Fuel) in the national and provincial Press. A sum of £23,000 was allocated to this campaign, which combined the fuel-saving theme with information on the subject of coal carbonization. Earlier plans for B.C.G.A. advertising, which comprised a fuel-saving campaign in the provincial Press, were nullified by the Government's announcement in April regarding the probable introduction of fuel rationing, and later by the failure of negotiations for joint advertising with the electricity industry. Short-term campaigns were conducted in technical journals on the theme of the services of gas to industry and fuel saving, and in the educational press on the subject of Gas Industry films.

Members continued to make use of the Association's local advertising service, and material ordered included Press advertisements, leaflets, letter headings, slogans, editorials, notes for speakers and, for one member, a quarterly magazine. A number of advertisement suggestions for members' use were circulated from time to time and were widely used.

The Association collaborated with the following Government Departments: Ministry of Fuel and Power (fuel-saving campaign); Ministry of Food (national food campaign); Ministry of Agriculture ("Dig for Victory" drives); Ministry of Information and the Ministry of Works (window displays); War Office (films and lecture material for the troops); National War Savings Committee (window displays); Board of Trade (clothes rationing and the "Make Do and Mend" Campaign) and also with the B.B.C. regarding broadcast talks, &c. Government Departments fully appreciate the value of the Gas Industry as a medium for the dissemination of their propaganda and as a personal link between the public and the Ministries.

All publicity material produced by the Association had as its primary object the furtherance of one or other of the Government's campaigns. The Association was in close touch with the Mines Department (latterly the Ministry of Fuel and Power) on the national fuel-saving campaign. The Association is represented on the Ministry's Publicity Committee. Members were kept informed, as far as possible, of the Ministry's policy, and the Association acted as a clearing-house for publicity material produced by the Ministry for the campaign; it also brought to the Ministry's notice from time to time the support being given by undertakings individually and by the Industry in general.

The Rota Window Display Scheme, which was based upon units provided free by several Government Departments, proved highly successful. It is being extended over a further period. The Association's lecture material was in frequent demand, and many requests were received from school teachers as well as from several of the Army Commands for the loan of lantern-slides.

Several Gas Salesmen's Circles found it possible to continue to function during the war. At the request of The Institution of Gas Engineers the views of all the Circles were canvassed on the "Standardization of Gas Appliances," and these were embodied in a memorandum submitted by the Association to the Institution.

The work of Home Service in maintaining and improving good relationship between undertaking and consumer was furthered by the co-operation of gas undertakings in various Government campaigns. Individual undertakings, while creating local goodwill, at the same time increased the prestige of the whole Industry.

The Ministry of Food's "Recipe of the Week" was demonstrated in close on 200 showrooms, supported by Government advertisements, posters, extra food permits, and B.B.C. Kitchen Front speakers. The Ministry's Information Boards, displayed in 540 gas showrooms in all parts of the country, gave the Government a national coverage for the dissemination of information. On the National Food Campaign the Home Service Section acted as liaison between the Ministries

of Food and Agriculture, and the Board of Education and gas undertakings. Contact was also maintained with national organizations whose work was related in one aspect or another to the activities of the Gas Industry.

There was a steady demand from members for showroom publicity material of a topical and/or instructive nature, and notwithstanding the scarcity of labour and material the production of window display posters and showcards for linking up with "Fuel Saving" and other Government Campaigns was well maintained. Complete exhibits were designed and produced for four exhibitions.

Throughout the year the Association's Film Library (consisting of twenty-two sound films, eight of which are available also in silent versions) supplied films on loan to borrowers. Many requests were received from schools, Youth Movements, the Army, the Royal Air Force, Civil Defence, and other organizations. At the request of the Army Educational Department, copies of a selected list of Gas Industry films were supplied for inclusion in the official Army educational programmes. In addition to the direct distribution of films to borrowers by the Association, 170 copies of films were permanently loaned to thirteen long-term borrowers. All films were heavily booked through the latter's distributive systems. The Ministry of Information had eleven Gas Industry films in constant circulation with their programmes.

District meetings have been held in the following areas : Eastern, London, Midland, Northern, North-Western, Southern, South Wales, Yorkshire, and in Scotland.

In regard to post-war planning, a joint meeting of the Central Executive Board of the National Gas Council and the Executive Committee of the B.C.G.A. was held in the late autumn to consider reconstruction proposals, which continue to receive the attention of the respective national bodies.

During the year under review Mr. E. V. Evans, O.B.E. (President of The Institution of Gas Engineers), became the Association's First Vice-President.

The Committee records with regret the death of the following members: Messrs. G. Airth (Dundalk), J. M. Campbell (Margate), L. J. Langford (Tunbridge Wells), J. Taylor (Weston-super-Mare), John Wilson (Dundee).

Proposed Acquisition of Electricity Undertaking

Discussion has taken place by the Ashton-under-Lyne Town Council of a proposal by Gas Consolidation, Ltd., the parent Company of the Ashton Gas Company, to acquire the electricity undertaking of the Ashton Corporation. Recently a deputation of gas interests waited on the Corporation Finance Committee and stated that in consideration of post-war developments, the Gas Industry has been requested by the Ministry of Fuel and Power to formulate plans for the reorganization of the Industry, and they were exploring the possibility of the merging of gas and electricity interests.

In connexion with the proposal to acquire the Corporation's electricity undertaking, their outline of the financial arrangements suggested that the balance of the cost of acquisition should be met by the issue to the Council of preference shares in the company controlling the concern. Also it was proposed that the Council should appoint representatives to act as directors, thus giving the consumers, through the Council, representation in the direction and control of the undertaking. The deputation stated that if their proposals were favourably received by the Town Council, it was proposed to open negotiations on similar lines with other local authorities, with the object of establishing a regional scheme which might be acceptable to the Ministry.

The Town Clerk suggested that the establishment of a public utility corporation to take over both the electricity undertaking and the Ashton Gas Company might be more favourably received by the Town Council, and the gas interests did not decline to accept this suggestion. The Town Council appointed representatives to consult with the local M.P. with regard to the proposal.

Gas Analysis

A method of and apparatus for the quantitative analysis of gas form the subject of Patent No. 550323 (application date, June 27, 1941) taken out by the Gas Light and Coke Company and W. J. Gooderham. In prior patent No. 489,117, there is described a method of quantitative analysis wherein the gas is caused to flow through a succession of transparent calibrator tubes of known capacity having each of their outlets connected to an absorber for extracting a required constituent of the mixture, and wherein a soap film is introduced into each of the calibrator tubes so as to be traversed by the flow of gas along the tube, the time of traverse in each tube being measured. Thus, knowing the velocity of the gas and the capacity of the calibrator tubes, there can be calculated the amount of gas flowing through the various tubes in a given time. By comparing these amounts there can be ascertained the amounts of the constituents extracted by the various absorbers.

According to the present invention, the method of analysing a mixture of gases such as is outlined in the specification of patent No. 489,117 is modified in that instead of timing the traverse of the soap films along the calibrator tubes, the displacements of the soap films along the tubes are measured either for a given displacement of the soap film in the calibrator tube connected with the inlet of the first absorber or during an arbitrary interval of time. This may be effected by starting and stopping the flow of gas through the calibrators simultaneously, having initially formed the soap films therein. This method dispenses with the necessity of employing a stop-watch, and the quantity of gas extracted by the absorbers can readily be determined by subtracting the volume indicated by any one calibrator from that indicated by the previous calibrator.

Thus, by comparing the volume indicated by the displacements of the films, there can be calculated the amounts of the components removed by the absorbers. For example, gas is allowed to flow through, and soap films are formed in each calibrator. When the soap film in the first calibrator indicates a predetermined volume, the flow of gas in the calibrators is stopped and readings of the volumes in all the calibrators are made. The flow through the calibrators is then continued until a known volume has been displaced in the first calibrator, beyond the first reading, when the flow is again stopped and the volumes in all the calibrators are read. Thus, although the act of forming a soap film may effect a small displacement of the gas in the calibrators, a true comparison of the various volumes may be obtained by subtracting the first reading in each calibrator from the final reading. An important feature of the invention consists in stopping the flow through the calibrators by diverting it from the inlet of each calibrator to its associated absorber, thereby maintaining a constant flow of gas through the apparatus.

The apparatus for carrying out this method thus comprises alternate absorbers and calibrators, each of which absorbers is provided with a reagent for absorbing or reacting with a particular constituent of the gas, together with a calibrator connected with the inlet of the first absorber for measuring the gas entering the apparatus, a movable device associated with the lower end of each calibrator for forming a soap bubble therein, and valve means arranged to start and stop the flow of gas through the calibrators. Preferably, a valve is associated with each calibrator, and is arranged to cut off or divert the supply of gas from each calibrator while the film is being formed therein. Preferably the soap-film-forming device is interconnected with the valve means, so that the flow is automatically cut off or diverted during the formation of the soap film, and means are provided for simultaneously operating the film-forming devices and the valves.

In one constructional form of the apparatus the inlet end of each calibrator tube is arranged to project into a closed inlet chamber, and a well for soap solution is so reciprocably mounted in the chamber that the end of the tube may be immersed in the solution. An inlet tube and exhaust tube communicate with the inlet chamber, and are controlled by a valve operated by the movement of the well so as to place the inlet tube in communication with the exhaust when the well is moved upwards to form a soap film.

The analytical procedure, state the patentees, is simple. The wells of soap solution are raised and lowered and soap films formed simultaneously in all the calibrators. As the film in calibrator 1 approaches the zero marking of the calibration the wells are quickly raised so that the film in calibrator 1 is stopped at zero or at some other known value. The films in all the other calibrators stop simultaneously and the position of the film in each calibrator is read from the graduation. The soap wells are then dropped and the gas is allowed to flow up the calibrators until the film reaches 100 or a position 100 units displaced from the first reading in the first calibrator, when the films are all stopped again and their positions read on the graduators. In this way, while 100 volume units are displaced in calibrator 1, the corresponding volumes, which represent the gas stripped of one or more of its constituents, are displaced in the other calibrators. The percentage of each constituent can therefore be obtained directly by subtraction, as can be seen from the following example for an analysis of coal gas:

Calibrator	1	2	3	4	5	6	7	8
Vol. at top	100	98.2	96.3	95.2	42.8	33.2	34.9	8.1
,, ,, bottom	0	1.4	1.4	1.3	1.5	1.9	1.3	0.2
Difference	100	96.8	94.9	93.9	41.3	31.3	33.6	7.9
i.e. initial gas less	*Nil*	CO_2	CO_2	CO_2	CO_2	CO_2	paraffins burnt to CO_2	everything except N_2
	unsaturated hydrocarbons	unsaturated hydrocarbons O_2		unsaturated hydrocarbons O_2 H_2			unsaturated hydrocarbons O_2 H_2 CO	

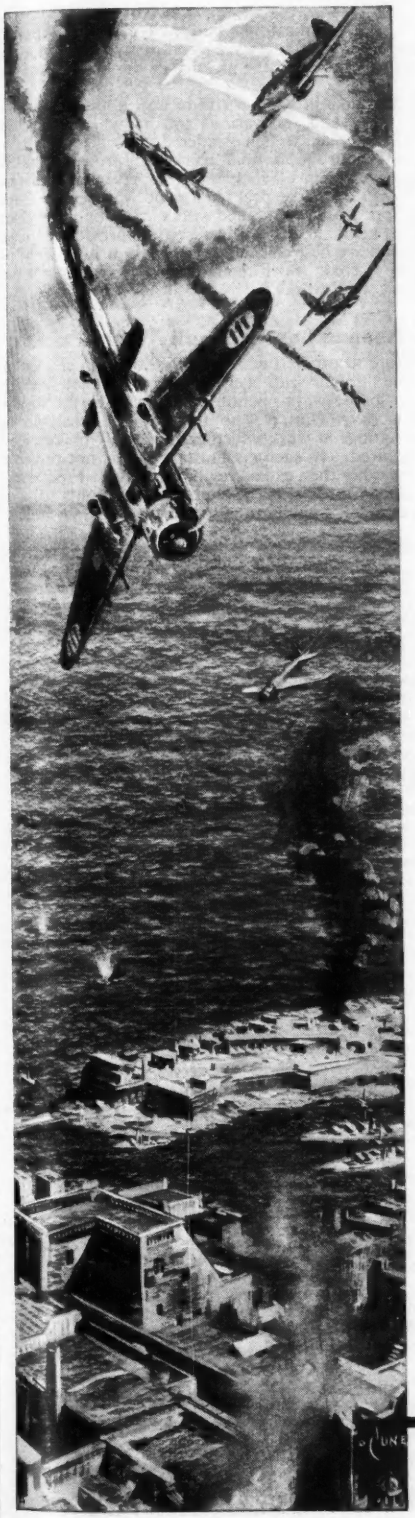
The analysis of the gas therefore becomes:

$\%CO_2$	unsaturated hydrocarbons	$\%O_2$	$\%H_2$	%CO	%"C_2H_6"	%"CH_4"	$\%N_2$
3.2	1.9	1.0	52.6	10.0	2.3	21.1	7.9

With the above arrangement the calibrators may be calibrated directly in percentages.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

The little things . . .



Malta,

Little Island

that would not yield to savage might.

Immortal symbol of all little things which,

having faith and courage and endurance shall prevail

against the dark destroying powers.

Little squadrons—

how little once—

that charged into big formations and scattered them.

Little ships that fought through

tempest of flame and sea to bring supplies.

Little homes shattered;

Humble folk carrying on in Malta . . .

as in Britain . . .

Island to Island . . .

calling . . .

'Carry on.'

* * * *

This war is being fought for the rights of little things—the sacred right of little folk to live their lives unmolested by big gangsters. It is being won by millions of little sacrifices, little efforts—and millions doing their 'bit.' Our duty is to make our 'bit' bigger—which means, here and now, work harder and SAVE MORE.

SPACE GIVEN BY THE WOODALL-DUCKHAM COMPANY, EPSOM ROAD, GUILDFORD (Tel. GUILDFORD 3301)

Issued by the National Savings Committee

FUEL ECONOMY IN GAS WORKS

No. 8

We are indebted to the Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd., for permission to reprint a series of notes specially compiled for them by G. M. Gill.

GAS QUALITY IN SMALL WORKS

IN the last article the quality of gas produced in small works was discussed at some length, but before leaving the question of gas quality in small works it may be advantageous to include a summary of tests of the gas produced in nine small works, all under 25 million cu.ft. per annum, and to which chemical service was given by one of the travelling chemists.

The figures for 1939 so far as concerns calorific value, specific gravity, and inerts, with percentage variations are included in Table I, with other details affecting fuel consumption in Table II. Actual analyses of the gas produced have been omitted from Table I, though these particulars are available for anyone who wishes to study this question in greater detail.

As will be seen, the figures of these nine small works are based upon a considerable number of tests throughout a whole year—*i.e.*, 1939—all made by a skilled chemist; and accordingly the average in the case of each works is a fairly stable figure. For none of these works was there an Official Examiner.

For the most part the figures show wide variations and much greater than in large well-run gas-works. As regards percentage variations in calorific value, only three are in single figures, which is reasonably satisfactory for a small works, while three had variations of over 15%, which is definitely bad.

In specific gravity only two had variations of less than 15%, while three exceeded 20%, which is much too high. All the gas was very heavy, being with one exception in excess of 0.55.

The inerts percentage of the group averaged 23.3%, but of the nine companies nearly all were well over 25%, while as regards the variation in inert percentages only one can lay claim to being consistent with a variation of 13.8% from maximum to minimum.

This summary discloses what the Author considers is an unsatisfactory state of affairs. The gas is too heavy, too high in inerts, and too variable to be a satisfactory product; nevertheless he believes that these results are superior, possibly considerably so, to what would be found in other small works.

The small works indeed seems to present an awkward and difficult problem, even if it produced its gas of steady and uniform quality, which again is difficult to do in a small works and is rarely achieved in practice. In fact, the Author considers that the variations shown in Table I of calorific value, specific gravity, and of inerts, high as these are seen to be, are probably a good deal less than would normally be found in other works of similar size, where there is no recording calorimeter, where no travelling chemist visits the works regularly, and where there is no headquarters to lay down the law when necessary.

It will be apparent to all technical men that the type of gas supplied from small works, and unfortunately by a good many others, too, is not good enough to maintain either the prestige or the business of the Industry.

The questions of the make of gas per ton of coal and of fuel consumption in small works and the various factors which influence waste in these directions remain to be considered.

As indicated in the Tenbury tests, small works can produce a satisfactory yield of therms per ton of coal, though for various reasons the results in small works in this respect lag a good way behind those in large, properly equipped, and well staffed works. In this connexion, the Author has already dealt at considerable length in previous articles with the methods which are best calculated to obtain a high yield of therms of gas per ton of coal. Such methods in this respect are the same in both large and small works.

Fuel Consumption in Small Works

He proposes therefore to proceed with the question of fuel used in small works. Anyone familiar with such works knows that the size of unit in relation to load always operates very much to the disadvantage of the small works. Thus, it is not unusual for a small works to have a setting or settings at work which could readily make twice as much gas as is required. In such circumstances it is not possible for the fuel used to be other than excessive and wasteful. Frequently in such works the setting in use must be shut down at nights to save excessive wages costs, and sometimes also because of low holder storage capacity.

Set out in Table II are the average daily gas demands during the months of January and July, 1939, of nine works making less than 25 million cu.ft. in the Severn Valley and Gas Consolidation Group. Particulars are also included of the number of retorts (singles) in each setting, and the number of retorts required to meet the average daily gas demand on the basis of 7,000 cu.ft. per retort, which allows a margin for scurfing.

There is also stated the percentage of total capacity of the setting or settings at work, from which it will be seen that in most cases there is a large amount of spare productive capacity, which cannot be avoided in small works. Obviously a manager must have enough heated retorts to meet any likely load or to cope with a breakdown. Further, if he has, say, settings of six retorts and the expected demand requires seven retorts, he must perforce light up and work another setting with all the waste of fuel it will entail.

In this respect another factor must be taken into account. Column

TABLE I.—SUMMARY OF CHEMICAL TESTS ON GAS MADE IN NINE SMALL WORKS IN 1939.

Works.	No. of tests cal. power. 1939.	Declared calorific standard.	B.Th.U. Av.	B.Th.U. Max.	B.Th.U. Min.	% Max. variation. (a)	Specific gravity. No. of tests.	Specific gravity. Av.	Specific gravity. Max.	Specific gravity. Min.	% Max. variation. (a)	Inerts. No. of tests.	Inerts. Av. %.	Inerts. Max. %.	Inerts. Min. %.	% Max. variation. (a)
A	23	None	517	582	455	24.5	11	.55	.63	.48	27.2	11	16.0	22.7	12.6	63.1
B	27	,,	497	506	481	5.0	13	.58	.64	.54	17.2	14	25.5	29.4	23.0	25.1
C	36	,,	496	532	435	19.5	17	.58	.63	.61	20.7	16	24.9	31.3	19.4	47.8
D	62	,,	495	516	476	8.0	8	.60	.64	.57	11.6	15	26.7	34.2	22.6	43.5
E	28	,,	490.9	509	471	7.7	15	.62	.68	.57	17.7	13	28.2	31.3	23.3	28.3
F	29	475	482	501	451	10.4	15	.58	.63	.54	15.5	12	28.1	30.7	26.8	13.8
G	17	500	479.1	540	420	25.0	17	.56	.620	.497	22.0	12	27.5	35.3	19.6	57.0
H	45	500	474	518	456	13.0	20	.58	.64	.53	19.0	20	26.9	37.1	23.7	49.8
I	26	450	459	498	436	13.5	13	.61	.64	.56	13.1	13	29.9	34.6	26.8	26.0

(a) Calculated on the average figure.

TABLE II.—FIGURES AFFECTING FUEL CONSUMPTION IN SMALL WORKS.

Works.	Make in millions per annum. cu.ft.	Units of plant.	Coke made for sale. cwt./ton.	Therms made per ton.	Thermal efficiency.	Max. days send-out on record.	Average day's send-out. Jan., '39. cu.ft.	Average day's send-out. July, '39. cu.ft.	Retorts required at 7,000 cu.ft. Jan.	Retorts required at 7,000 cu.ft. July.	Percentage of fully heated retorts making gas. Jan.	Percentage of fully heated retorts making gas. July.
A	4.91	2 beds of 4	5.70	61.97	53.1	24,000	15,064	9,935	2.15	1.42	54.0 (4)	35.5 (4)
B	12.13	3 ,, 6	6.60	69.77	60.5	56,000	43,360	24,080	6.19	3.44	100 (6)	57.3 (6)
C	23.53	3 ,, 6	7.11	70.43	62.8	92,000	79,080	46,710	11.30	6.67	94.1 (12)	55.6 (12)
D	9.75	2 ,, 6	9.80	68.73	75.0	40,000	32,360	21,071	4.62	3.01	77.0 (6)	50.01 (6)
E	9.16	Bed of 6 ,, 8	6.26	59.68	55.8	51,000	29,928	23,500	4.27	3.36	71.1 (6)	56.0 (6)
F	22.78	2 Beds of 8 1 Bed of 6	10.57	65.66	78.2	104,000	83,097	49,645	11.87	7.09	84.8 (14)	88.6 8)
G	14.92	3 Beds of 6	6.47	65.72	57.3	52,000	44,226	38,130	6.31	5.44	52.6 (12)	90.7 (6)
H	21.34	2 ,, 8	9.58	63.07	71.9	92,000	60,794	54,090	8.63	7.72	54.2 (16)	96.5 (8)
I	7.84	2 ,, 6	6.92	65.57	59.0	25,000	22,970	17,903	3.28	2.56	54.7 (6)	42.7 (6)

N.B.—In the last two columns the figures in brackets show the number of fully heated retorts available for gas-making. The figures above in the same columns show the percentage of fully heated retorts making gas under average conditions in those particular months.

7 sets out the maximum daily send-out on record in the case of each of these small works. As will be observed, it shows a large increase over the average of January, 1939. Accordingly a prudent manager cannot ignore the possibilities of a greatly increased demand due to a spell of extremely cold weather, and must therefore retain a sufficient number of heated retorts to provide against this contingency during at least three winter months. This is another adverse factor rendering it difficult to produce good fuel consumption figures in small works. In larger works with, say, six or more settings the majority are working at 100% capacity, and as a consequence fuel results should be and usually are much more satisfactory.

Fuel Results in the Group's Small Works

The results in make of coke for sale in cwt. per ton of coal carbonized for the year 1939 are also included in Table II, from which it will be seen that the figures for the most part do not compare with those normally obtained in larger works, nor does the Author expect it.

It will be worth while to calculate also the quantity of coke burnt per ton of coal carbonized. Normally it is not possible to ascertain fuel consumptions, as the coke made per ton of coal in horizontals cannot be weighed, but the quantity of coke made—all of which was weighed—during the series of tests at Tenbury and which were included in Article No. 7 will form a fairly close guide in this respect.

In the Tenbury tests the coke made was equivalent over the series of tests to 12.70 cwt. on the dry basis, including breeze, per ton of coal carbonized. As in the 1939 figures of the nine small companies, whose results are set out in this article, 9,264 tons of coal were carbonized and 3,754 tons of coke were made for sale (8.10 cwt. per ton), it follows that on the Tenbury basis 2,129 tons of coke including breeze were used for fuel. This is equivalent to a fuel consumption of 4.6 cwt. per ton of coal carbonized, or 36.2 lb. per 100 lb. coal, or to 4.8 cwt. and 39.8 lb. respectively if allowance of, say, 5% be made for moisture in the coke sold.

This is a high figure for fuel consumption, but, even so, the Author believes that the fuel results in these works compare quite well with most other works of similar size.

As will be observed, Works F shows a very good result in fuel consumption, which, incidentally, is not a flash in the pan, as it has produced such results over quite a long period of years. It is noteworthy that the productive capacity of the plant at work closely approximates the gas demand, but apart from this the works uses no steam except for holders in times of frost, the only coal used is one of the best in the country, and the three stokers who do the work are skilful, and take as much interest in their work as though the works belonged to them.

Works D is the Tenbury Works, which at that time was being used as a coal-testing station, and was being closely supervised by a competent chemist. The wall temperature of the retorts had to be maintained at 1,000°C., which entailed close attention to the working of the producer, while the setting itself was of excellent design, and the stokers were receiving "test" money for carrying out instructions strictly to programme. Even so, the result in fuel consumption is very good and exceptional for a small works.

The fuel result of Works H is also quite satisfactory. In this case no boiler was in use, the stokers were exceptionally good, while the coal was of high-class quality.

Before concluding this article the Author would draw attention as a matter of interest to the thermal efficiency figures set out in Col. 6 of Table II. These are calculated on the basis described in No. 1 Article of this series. As will be observed, a good make of coke for sale per ton of coal carbonized has a big effect on thermal efficiency, and incidentally also on the fuel index figure, which it might be pointed out is equivalent to the difference between the thermal efficiency percentage and 100%.

In the next article the Author proposes to make suggestions for the improvement of the gas supplied by small works, and of works results to bring about an economy in fuel.

"OF THINGS TO COME"

Discussion on Mr. Leopold Friedman's Paper—see "JOURNAL" of April 14, p. 464.

The **Chairman** (Mr. J. Graham, President of the Manchester and District Junior Gas Association) said that Mr. Friedman had provided a valuable contribution to the subject of domestic water-heating. Personally he was not going to try to deal with the planning of the home of the future as far as the home itself was concerned. That point must be left to be dealt with by others better qualified than himself. The main consideration was how to reduce drudgery in the post-war home. Upon the cessation of hostilities women would undoubtedly refuse to return to the household drudgery to which they had been accustomed in the past, and anything which could be done to ensure its abolition would be of definite advantage to the community at large. Those who had studied Mr. Friedman's Paper entitled "Domestic Water Heating : Economic Factors," published in the "GAS JOURNAL" of Dec. 3, 1941, would have realized that the Author had expressed his views firmly on the advantages of water-heating by gas for domestic purposes. It had been shown that with moderately-priced gas, together with the remarkable efficiency of modern water-heating appliances, water-heating by gas was an economical proposition. The business of recommending the right type of heater required careful consideration. In his Paper, Mr. Friedman had included possible installations and income groups. These had been carefully analyzed, and in each of those groups there were possible customers. Perhaps they might not all agree with the Author's views on instantaneous water heaters. It might be felt that the choice of storage or instantaneous water-heating would depend entirely upon the service required, the situation, and other factors; but, from a competitive point of view there was no doubt that the instantaneous water heater was a means of heating which was not practicable with any other type of fuel. The aim was to encourage the consumption of gas, and this could not be done with a small storage heater which had a limited output of hot water. The object that afternoon was to discover which type of water heater would best serve the interests of gas consumers, and the role of the salesman was of first importance. With his practical experience and knowledge of customers' requirements he should have no difficulty in recommending the right type of heater. The salesman's effort, however, must be backed by an adequate supply of gas at an adequate pressure, supplemented by the assistance of skilled mechanics with a knowledge of gas utilization and appliance design.

Mr. **F. C. Randall** (Macclesfield), while acknowledging the thermal efficiency of an instantaneous heater, thought there were many districts in which the thermal storage heater was to be preferred. He had to deal with a large, closely-populated area mainly filled with small cottages, and with no other means of obtaining hot water than by gas; there was no back boiler and no circulatory system. With many of the houses it was almost impossible to put in an instantaneous water heater, one reason being that the water mains were not adequate for present requirements. When people were going to work early in the morning, and everybody was drawing water at once, there was considerable difficulty experienced with instantaneous heaters failing to operate owing to lack of water pressure. The only solution of the difficulty appeared to be the thermal storage heater. Other factors had to be borne in mind also. In the case of many of the cottages it was not possible to improve the installation inasmuch as the meter was at the front door or in the front room cupboard, and the construction of the house did not permit of the putting-in of pipes of sufficient margin to carry to an instantaneous heater which might be anything from 60 to 80 ft. away from the meter.

Mr. **Friedman** said that adequately to answer Mr. Randall's remarks would involve the writing of a comprehensive Paper. He thought that neither his firm nor he had ever stated that the instantaneous gas water heater was the only type to install. There was room for all types, and there were local conditions and purposes when the thermal storage water heater would be preferable to the instantaneous heater. With a full knowledge of the facts of the case a gas thermal storage water heater might be preferable, but there were conditions, possibly, which might rule out even that. He was not present to defend the universal use of the instantaneous water heater; the aspect of the case went deeper than that. Yet ten years ago there was stressed in every technical paper and on every hoarding the use of one type of gas water heater, and that water heater was the thermal storage water heater. If the proof was in the heating, then why was it that in a very short space of time almost 80% of all installations in this country were of the instantaneous type?

He had not previously thought of mentioning the matter, but in the current number of the *Electrical Times*, March 25, there was an article entitled "Electricity and Gas." In it reference was made to a speech by the Minister of Fuel and Power, the Rt. Hon. Gwilym Lloyd George, at the E.D.A. Luncheon, dealing with post-war collaboration of the gas and electrical industries. The article went on to ask "what precisely he (the Minister of Fuel and Power) had in mind, more particularly not merely because it may have important effects on our own great and growing industry, but because the future well-being of the masses of British people is involved. Electricity holds the promise for housewives of emancipation from domestic trouble and a healthier and freer life. They are becoming aware of the fact and demanding fulfilment of their hopes. The road by which that can be achieved is not the road of co-operation with the Gas Industry, unless we grossly misinterpret what is implied by co-operation." The article went on, "Consider what is really the crux of the issue—domestic services. Wherein are electricity and gas complementary? For lighting there is only one possible free choice; the Gas Industry admits it. For small power purposes—radio, irons, washing machines, vacuum cleaners, &c.—again the Gas Industry would not seriously suggest there is any alternative to electricity. There remain cooking, refrigeration, and space and water heating. Pre-war, millions, and millions is strictly true, of electrically-operated appliances were providing these services. In face of that fact no one could maintain that electricity is not a practical alternative to gas and coal for these purposes. . . . How then can alternatives be considered complementary? Where one

medium is adopted for a particular service by a particular user, the other is automatically excluded. The plain fact is that in their nature electricity and gas are in the main mutually destructive and nothing is to be gained by glossing over the fact with meaningless phrases." A little further on in the article there appeared the statement: "We are under no delusion that the Gas Industry will not continue to be as strong and important an industry after the war."

In the same number there was a report of the annual meeting of the Electrical Development Association, at which the Minister of Fuel and Power was present. During a discussion on post-war planning Mr. Blackiston (Swansea) asked "what the views of the Council were with regard to co-operation after the war. His own view was that the gas people had fought the electrical industry to the death and had been beaten to a frazzle and they should not carry their gas competitors on their backs after the war. . . . Mr. Blackiston suggested that a resolution might be passed that there should be no post-war co-operation between E.D.A. and the Gas Industry. The President said so far as E.D.A. was concerned it did not mean that they were to accept the proposal in the mind of the Minister of Fuel in days to come, but it was not desirable at this juncture to pass any resolution on the lines suggested."

Mr. Friedman said he read these comments because it was important to remember that in spite of the fact that most of them honestly desired co-operation with the electrical industry, yet such a desire was being interpreted in some quarters as a sign of weakness on the part of the Gas Industry. He was aware that this view was not justifiable and he could pull the statement to pieces very easily; but it was the mentality of the electrical industry, and they were doing all they could to bring about a recognition of this mentality among consumers. The Gas Industry might have to look forward to very severe competition after the termination of the war.

He hoped that those present would agree with him that the way to compete with somebody else was not by producing the same article but by producing something they could not imitate, and it would not be possible to imitate the gas appliance industry for many years to come; at least in the matter of instantaneous gas water heaters.

Mr. **F. C. Randall** did not feel any concern on account of competition from the electrical industry as long as gas could be supplied at anything like the present-day price.

Mr. **J. B. Stewart** (Rochdale) said that in contemplating "Things to Come" really nothing could be done at the present time because there was not the material available to do it with. But were they directing their propaganda to the right quarters, such as city architects, town architects, town-planning departments, &c.? It was not only necessary for gas undertakings to get in touch with such people, but the manufacturer of gas appliances must also help, and gas salesmen, in their turn, must help the gas appliance makers. He suggested that the manufacturers of gas appliances were the people first to get in touch with the right kind of people, at the same time enlisting the support of local authorities. Only by such means could the sale of gas be pressed forward in the post-war world.

Mr. **Friedman** thought that if all gas appliance manufacturers took Mr. Stewart's words to heart a good progressive programme could be evolved.

Mr. **Atkinson** (Burnley) said that Mr. Friedman's statement that 60% of people still carried water to their baths was somewhat of a revelation, especially to gas salesmen, who endeavoured to persuade the public to install gas water-heating appliances.

Upon the motion of Mr. **S. H. Packer** (Manchester, Chairman of the Lancashire District Gas Salesmen's Circle), seconded by Mr. **J. Albinson** (Manchester), a vote of thanks was accorded Mr. Friedman for his Paper, and Mr. **Friedman** responded.

BURNING OF PITCH CREOSOTE MIXTURES

Mr. **H. M. Brack,** Chairman of the Midland Regional Fuel Efficiency Committee, opened an informal discussion on "The Burning of Pitch Creosote Mixtures" at a meeting of the Institute of Fuel (Midland Section) at the James Watt Memorial Institute, Birmingham, on Mar. 31.

Mr. Brack said his experience of the problems involved was probably as broad as any in the Midlands so far, because his company had turned over its stamp shop entirely to pitch creosote operation. They had in addition a boiler house installation working on pitch creosote mixture, and were now changing over the firing of the converters in their steel foundry to the same fuel. On that point he could not give much information as they were only in the process of changing, but they had had a fair amount of experience in the stamp shop, extending over 18 months, in which they had been helped considerably by the fact that during the last war they operated on a pitch mixture of some kind, probably not so much of a pitch creosote mixture as they were burning to-day. Pitch creosote mixture was introduced into the works as part of the Government's war effort to reduce the quantity of imports of fuel oil into this country. Previously they had been using pitch, and they had to transfer gradually from one grade of fuel to another until they arrived at the pitch creosote mixture they were now using.

With regard to the stamp shop, which was one of the greatest fields for pitch creosote mixture usage throughout the country, their existing installation consisted of a certain amount of tankage, both underground and overhead. They had to add overhead tankage because, although the mixture was adopted from the point of view of fuel economy, it was in short supply, and at the very beginning deliveries were made in irregular fashion and they had to take the tankage sent to them by rail. The mixture was distributed round the stamp shop by means of a 2½ in. diameter lagged ring main which fed the various furnaces. They had calorifiers working on 25 lb. per sq.in. steam pressure, both in the circulating pump house and on several heaters dispersed round the ring main which fed the furnaces either singly or in batches. The circulating temperature was maintained at approximately 100°F., and in the heaters situated round the ring main the fuel temperature was raised to approximately 180°F. before finally reaching the furnaces. The reason they did not circulate at this higher temperature was the possibility of carbonizing the pitch creosote mixture during the time that it was stationary in the circuit. When the steam used for heating was shut down for one reason or another they could burn the mixture at about 90°F., but their best results were obtained when it entered the burners at 180–200° F. Particular care was taken to see that the temperature in the ring main did not rise above 100°F. because of the danger of carbon deposit, which would result ultimately in its choking.

Difficulties encountered in using this fuel could be summarized into two categories. The most troublesome feature was the question of the effective ventilation of the stamp shop, which was generally polluted with smoky atmosphere and myriads of carbon particles which were deposited over the machinery. They had a large battery of furnaces from which, due to their position round the drop hammers, it was very difficult to extract the particles to the outside air through an exhaust chimney, and there were dense clouds of black smoke in the shop. The sparks were just unburnt carbon particles, and they had a deleterious effect on the lubrication of moving parts and on the electrical installation. The automatic switchgear of their motors had not hitherto been enclosed, but they would probably now have to have the entire system totally enclosed for that reason. The second category of difficulties concerned the question of the efficient atomization of the fuel in the furnace itself in order to obviate the pitting of the surface by white hot carbon particles on the mild steel billets prior to stamping. These particles seemed to have a power of penetration which was new in furnace experience.

With regard to the former trouble they had arranged as a temporary war measure to install three large sets of hoods costing something in the region of £1,000, with interconnecting ducting to a large fan for extracting the smoky atmosphere direct from the furnaces themselves to the outside air. This seemed to be the only positive method of clearing the stamp shop atmosphere as a whole. The roof ventilation of the stamp shop, which was designed to give 20 changes of air per hour, was found to be inadequate to deal with the dense volumes of black smoke that arose from the starting up of the furnaces on the pitch creosote mixture. In consequence of the necessary extra air changes per hour they had had to arrange for adequate intakes of fresh air. All these circumstances, allied with black-out problems, the heating installation and the calorifiers at various parts of the line would show that even if the fuel was efficient and represented a saving there had been a lot of man-hours expended in making the necessary alterations. Apart from structural alterations they had had to study the question of new burners. They experimented with three types, two of them of the low-pressure type operating on an air pressure of something between 12 and 18 in., and one using high-pressure air for atomization. One designed by a member of his own staff was operating very well and gave better results than the other two. With regard to the burners, in an endeavour to reduce the quantity of fumes from the furnaces themselves, which incidentally was one of the major problems, not only for the operators, but for the plant, they tried first of all a burner put up to them by the Midland Petroleum Board. Then they tried the burner they introduced themselves, and then one introduced by Messrs. Urquhart, of Bristol, using high-pressure air for atomization.

Experiments on the burner to the design submitted by the Midland Petroleum Board were found to be fairly economical, and figures had been obtained with oil quantities varying between 3¾ and 6¾ gall. per hour, according to the different air pressures used. The variations in these readings were obtained by using air pressures from 5 in. to 19 in. W.G. at the burner itself. Practical difficulties arose, however, from the choking of the $\frac{3}{16}$ in. inner tube during the periods when the burner was shut down for a few hours. Every operator, when he closed down his furnace, simply turned off the oil at the burner, and the result was that the small jet orifice carboned up, so that he could not get the oil through when next he wanted to start up. They had found that this could be overcome by connecting a steam supply through a three-way "L" ported cock, which could supply pitch creosote mixture in the one position and steam in the other for clearing through when shutting down. Experiments were made with an air spinning vane for giving an air spin at the nozzle, with angles varying between 15° and 45° in an endeavour to shorten the flame. They found, however, that even with the latter they were unable to shorten the flame sufficiently for some of the small furnaces at present in use in the stamp shop.

They now had quite a number of low-pressure burners of their own

design, and they had not presented any practical difficulties in the way of choking, on account of the large diameter of the supply jet. In addition this burner had extremely large air annuli to ensure a sufficient quantity of air being supplied for the complete combustion of the fuel in the furnace. The normal burner was deficient in air supply, and they arranged vanes close to the end of the burner to cause the air to spin in opposite directions to increase the velocity of the air at the point of impingement, where it struck the jet in order to give the maximum amount of atomization with the available low pressure. They were going forward along those lines, and arranging to install that type of burner on all the furnaces in the stamp shop because they thought it was the best. The burner supplied by Messrs. Urquhart had been in operation only about a fortnight. The primary air for atomization was supplied by using some of the air used on the blast screen, this being by-passed by means of a branch pipe through a valve to the burner itself. The blast screen pressure was in the region of 3 lb. per sq.in. Secondary air was admitted at the usual pressure used on low-pressure burners—*i.e.*, about 12 to 16 in. W.G. One of the main objections to high-pressure atomization was that the high air velocity impinged particles of the pitch creosote mixture into the bricks themselves at the back end of the furnace, with the result that the burning carried on almost within the brick itself, with rapid disintegration of the brickwork of the furnace walls. He could say that they were finding that that trouble existed, but whether it would be sufficiently serious for him to rule out the high-pressure atomization of the pitch creosote mixture he would hesitate to say at present.

With regard to the boiler house installation, they were using the Laidlaw Drew type of burner and atomizing the pitch creosote mixture by steam. The mixture was used in the comparatively small burners of upright Cochran boilers. At first they found some trouble in raising the mixture from the 100°F. at which they stored it with circulating steam pipes within the tankage itself. They then installed an auxiliary tank in which they raised the temperature to 200°F., and they were now changing over to larger bulk storage because they found that with the small tankage used the steam coil was tending to increase the temperature above 200°F., which was not desirable. The water of the steam tended to mix with the pitch creosote mixture. The pitch creosote mixtures were extremely delicate in character, and they were unfortunate in finding that their first bulk supply on which they used steam atomization resulted in the water making an acid content in the pitch creosote mixture. There was corrosion of the sides of the burner and erosion of the centre cone, which pitted away, with the result that in a short time they had to have complete replacements.

With regard to the foundry installation, their research chemist opposed the use of pitch creosote mixture for the conversion of steel on the ground that the sulphur content would have some bad effect in the steel being converted. At that point they stuck for several months because there were a lot of teething troubles involved in the stamp shop to be overcome before they started on the foundry. They did not appear to have the difficulties that were forecast by the research chemist and so they were now in the changing-over process in the steel foundry. He could not say at the present stage what the effects of converting steel with the pitch creosote mixture would be on the steel.

Dr. C. **M. Walter,** President, thanked Mr. Brack for opening the discussion, but said he could not agree with all he had said, because there were other people who would say they had not encountered all the troubles to which he had referred.

Mr. **J. E. Alderson** said his company, in the refining industry, changed over about 14 months ago from petroleum fuel oil to pitch creosote mixture for their three large refineries, and were having extremely little trouble. The efficiency was exactly the same as with petroleum fuel. They were burning the mixture in John Thompson water tube boilers raising 60,000 lb. per hour, and in Babcock and Wilcox boilers, and were employing Peabody atomizers. The three main points that had to be borne in mind were: (1) the lines must be jacketed or steam-dressed; (2) in changing over from petroleum fuel oil to pitch creosote mixture the system must be thoroughly washed through with creosote; and (3) some precautions were necessary as regards the welfare of the operators. Creosote tended to affect the skin, and unless rubber gloves were supplied, or other steps taken to keep the mixture away from the skin, there would probably be trouble. He wished to stress that they had had no trouble whatever in the change-over and they were now using the mixture in very large quantities. One reason why they had had no corrosion was that they had adopted up-to-date stainless steel orifice plates.

Mr. F. **S. Evans** said it was never contemplated that there should be complete conversions throughout the country all at one time. The tar industry had made available to the petroleum authorities sufficient pitch and creosote to meet all the demands arising from present conversions. The process was not a new one; it was in operation 28 years ago. Personally he had burners 40 years old which had been using a wide range of specifications. They had learnt from their experience that they must design the combustion chamber properly and must use a good refractory, and another point was that they used ferrous rather than non-ferrous metals for the burners.

Mr. R. **G. Fanning** said his firm had put in a complete installation for burning pitch creosote mixture and they had had a lot of trouble through the mixture being very unstable in burning. Their main trouble was the carbon deposit on the material in the furnace. When it was stamped they stamped the carbon deposit into the material, causing flaw marks and consequent rejects. So far as ordinary smelting furnaces were concerned they were getting on quite well. They had done experimental work with four different types of burners and the mess in the shop was considerable. The whole plant was smothered in black particles, and the Petroleum Board had offered no way of getting over the difficulty.

Mr. **H. W. Tildesley** said he was rather amazed that it should have been deemed necessary to call a meeting to discuss this question. At his drop forging works they had been burning pitch creosote mixture for ten or eleven years, and they had burnt it also in the last war, so there was a certain amount of experience behind them. It might be of interest to explain why they came to be burning this mixture instead of the ordinary imported mineral oil from America. The reason was that when Mr. Neville Chamberlain was Chancellor of the Exchequer in 1932 he put an import duty of a penny per gallon on the mineral oil. That was approximately £1 0s. 10d. per ton, and as he (Mr. Tildesley) was practically the proprietor of the business, which was using about 700 tons of oil a year, he felt that £700 was an important consideration, so he decided to burn the pitch creosote mixture. So far as he could tell there had been no difficulty at all about burning it provided certain elementary precautions were taken. The only practical difference between the two fuels was that the mineral oil remained liquid at a much lower temperature. The pitch creosote started to get very thick at 50°F. and became practically solid at 40°. A good temperature at which to distribute the mixture round the plant was 90°F., and the proper temperature for injection or atomization was about 150°F. It was very thin and fluid at that temperature and it atomized nicely with low-pressure air. For about six months before going over to pitch creosote they used creosote alone, and its effect in the system was to dislodge certain gelatinous matter, petroleum jelly presumably, which had become deposited in the tanks and pipes after using ordinary imported mineral oil. The little blobs of jelly stopped up the burners and they had to keep shutting down to clean out the burners. The trouble lasted for about a couple of days and by that time the stuff had gone and there was no more difficulty. He had been round a good many stamp shops, and he agreed with other speakers that the conditions in some of them were abominable. Very few people seemed to take the most elementary precautions to remove the fumes. He had noticed there was a growing reluctance on the part of workpeople to go into the drop forging trade partly because it was a very dirty trade. The reason was that people did not employ proper flues to take away their smoke. At his own works he had all the furnaces completely boxed in. Each furnace stood in a completely sealed chamber, excepting that there were small apertures in the front for the use of the operator, and if one held a lighted newspaper in front of one of those apertures the draught would take the flames into the flues and up the chimney into the open air. There was no smoke whatever arising from the furnaces in his stamp shop.

Mr. **R. F. G. Solbe** said his company were experimenting with pitch creosote mixture, but were concerned about the carbon deposits coming down and spoiling the glass which was being treated. They were working at a temperature of 1,000°C.

Mr. **Tildesley** said the carbon deposits were due to imperfect combustion. If they had the pitch creosote and air going in in the correct proportions they would not have any trouble. At his own works they were working at 1,500°C.

Mr. **A. E. Jones** said in changing over from mineral oil to pitch creosote there was a wide flame variation, and he strongly recommended those who had not already done so to start a burner department to give special attention to burner problems.

Mr. **R. J. Robinson** considered that the question of furnace design was at the back of all the difficulties about the so-called free carbon particles. Some of the speakers had attributed the carbon particles to the presence of free carbon in the fuel, but the real free carbon had nothing to do with the incandescent particles so frequently mentioned. He emphasized the necessity for washing down the system when changing over from one fuel to another.

Mr. **B. M. Thornton** said some of the speakers had referred to working temperatures of 1,000°C. and over. His company had a problem concerning a working temperature of 600°C., and he wondered what was the lowest temperature at which they could work with a pitch creosote mixture.

Mr. **Tildesley** replied that he could show Mr. Thornton a bakery baking bread at a very much lower temperature.

Mr. **Brett Davies** said the question of lower working temperatures was largely a matter of diluting the products of combustion. He endorsed the general remarks of some of the other speakers as to the dirty condition of some drop forging shops, but it was equally true that with proper conditions they could work in an absolutely clean atmosphere. It was wrong to attribute the smoke in a drop forging shop to the pitch creosote mixture. One cure for a certain amount of sparking was to pre-heat the air for the low-pressure air burners.

The **President** said the discussion had been very helpful. It would be difficult to say whether there were any inherent troubles that could not be overcome with proper design.

Mr. **Brack,** in a brief reply to the discussion, said that in spite of the criticisms he had offered his company were prepared to do what was necessary as a national obligation. He was glad to have had the opportunity of bringing the matter before the meeting.

Gas Products Prices

The London Market April 26.

All Coal Tar Products are in good demand, and Pitch in the London area remains about 45s.

The Provinces April 26.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 10d., pure, 2s. 5d. (controlled by the Control of Toluene No. 2 Order, July 3, 1941, which fixes the maximum price at which this material may be sold). Naphtha and Xylol controlled by the Coal Tar, Naphtha, and Xylol Order, 1942, dated Dec. 7, 1942, and operative from Dec. 21. Carbolic acid, 60's, naphthalene, and anthracene controlled by the Coal Tar Products Prices Order S. R. & O. 2509, dated Dec. 7, 1942, and operative from Jan. 1, 1943. Filtered heavy oil (min. gr. 1,080), 7½d. to 8d. Creosote oil has been generally controlled as to direction and price for some time past. Current value—fuel grades 5d. to 5½d.; timber preservation and other purposes 4¾d. to 6d.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland April 24.

Deliveries are substantial with prices unchanged. Refined tar controlled. Value is 4½d. per gallon *ex* Works, naked. Creosote oil: Specification oil, 6½d. to 7d.; low gravity, 7¼d. to 7½d.; neutral oil, 6d. to 6½d.; hydrogenation oil, 5⅞d. per gallon; all *ex* Works in bulk. Refined cresylic acid is in good demand at 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha, 6½d. to 7d. per gallon. Solvent naphtha: Basic prices delivered in bulk, 90/160 grade 2s. 8d., and 90/190 Heavy naphtha, Unrectified, 1s. 10½d.; Rectified, 2s. 3d. per gallon. Pyridine: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

Gas Stocks and Shares

The holiday caused some falling off in the volume of business last week, and although the gilt-edged section remained dull the general tone of the markets continued firm.

Activity in gas stocks and shares was also on a reduced scale, but here again prices were well maintained, and it will be seen that with one exception the few movements were in an upward direction. A feature was the rise of 5 points in Mid-Southern Utility, the stock changing hands at 93½. Among the gas stocks and shares available appears a parcel of £10,000 South Metropolitan 6% preference, on which it will be remembered the full year's dividend was paid last year, which is offered at 131 to yield £4 11s. 6d. %. Several other small lots of preference issues are available to give about the same return, but a parcel of Brighton 6% is offered at 120 to yield 5%.

The following changes in price were recorded last week:

OFFICIAL LIST

British Ord.	102—107	+2
Imperial Continental	80—83	+1
Mid-Southern Utility Cons.	90—95	+5
Primitiva Holdings Ord.	12/6—14/6	+/-6d.
South Metropolitan 6 p.c. Pref.	125—130	—1

PROVINCIAL EXCHANGES

Bristol Ord.	112½—114½	+1½
Newcastle Units	23/3—23/9	+/-3d.

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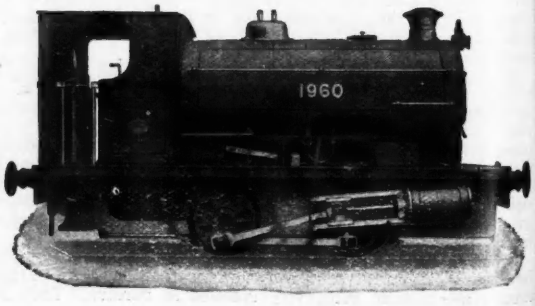
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